

**US ARMY CORPS OF ENGINEERS
NORTHWESTERN DIVISION
MISSOURI RIVER BASIN
WATER MANAGEMENT DIVISION**

**ADDITIONAL
SUPPLEMENTAL BIOLOGICAL
ASSESSMENT FOR THE 2002-2003
ANNUAL OPERATING PLAN**

April 2003



SUPPLEMENTAL BIOLOGICAL ASSESSMENT FOR THE 2002-2003 ANNUAL OPERATING PLAN

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**CORPS OF ENGINEERS
MISSOURI RIVER MAINSTEM RESERVOIR SYSTEM
2002-2003 ANNUAL OPERATING PLAN
ADDITIONAL SUPPLEMENTAL BIOLOGICAL ASSESSMENT
SECTION 7 CONSULTATION**

INTRODUCTION

This Additional Supplemental Biological Assessment (BA) augments the Corps of Engineers (Corps) correspondence of 14 March 2003 providing additional information regarding the Corps' two requests, both dated 22 January 2003, to reinitiate formal consultation on the current Water Control Plan (CWCP) for the Missouri River Mainstem Reservoir System (System) as described in the current Master Water Control Manual and the 2002-2003 Annual Operating Plan (2003 AOP). Attached to the above referenced letters were Supplemental BAs for the CWCP and the 2003 AOP and additional information requested in the United States Fish and Wildlife Service (USFWS) letter of 5 March 2003.

Subsequent to the 14 March 2003 correspondence, representatives of the Corps and USFWS met to explore alternative operations for the 2003 AOP that are based on the best available science, comply with the Endangered Species Act (ESA), and, simultaneously, provide sufficient operational flexibility to operate the System for all the authorized project purposes under a moderate to severe drought condition. In the course of these discussions, both agencies also recognized the interrelatedness of discussions on the 2003 AOP with the more comprehensive continuing consultation on the CWCP and have identified a number of common issues that need to be addressed in the course of detailed discussions on the CWCP.

This Additional Supplemental BA informs the USFWS of the status of the Corps' actions to comply with the November 2000 Final Biological Opinion (BiOp) and describes and clarifies the Corps' proposed operations during the 2003 nesting period for the interior least tern and piping plover. Based on the information set forth in this Additional Supplemental BA, along with the other information previously provided, the Corps believes that, while the proposed 2003 operation is consistent with the objectives of the November 2000 BiOp, it may affect the listed interior least tern, piping plover, and pallid sturgeon and critical habitat for the piping plover. As explained herein, there may be adverse effects to piping plover critical habitat, but these adverse effects will not appreciably reduce the likelihood of the survival and recovery of the species. The Corps does not believe the proposed action will adversely affect the bald eagle. Further, as explained in this Additional Supplemental BA, the actions taken toward implementation of the November 2000 Reasonable and Prudent Alternative (RPA) to avoid jeopardy, including creation of 2000 acres of shallow water habitat (SWH) by 2005 and continued hatchery support, will have a positive effect on the pallid sturgeon and will continue to offset jeopardy as described in the November 2000 BiOp. This is also true of the Corps'

actions to comply with the November 2000 RPA for the interior least tern and piping plover.

The proposed action for the 2003 AOP also provides the flexibility to minimize impacts to authorized project purposes during the drought period. The Corps is requesting that this Additional Supplemental BA be reviewed by the USFWS and that the USFWS provide a supplement to the November 2000 BiOp for the Corps' proposed action for the 2003 AOP.

The proposed action for the 2003 AOP described in this Supplemental BA reflects the moderate-to-severe drought currently being experienced in the Missouri River Basin. The action reflects the Corps' need to conserve water, serve Congressionally authorized project purposes, and comply with the ESA. The Corps believes that the proposed action minimizes adverse effects to the interior least tern, piping plover, and pallid sturgeon and to Congressionally authorized project purposes. As shown below, the Corps also believes that the proposed action is consistent with the objectives in the November 2000 BiOp.

DESCRIPTION OF THE PROPOSED ACTION

In addition to discussing the proposed action for the 2003 AOP, this Supplemental BA identifies all measures the Corps will undertake during 2003 relating to the listed species. This section will first describe the proposed action for the 2003 AOP followed by a discussion of additional measures to be implemented by the Corps.

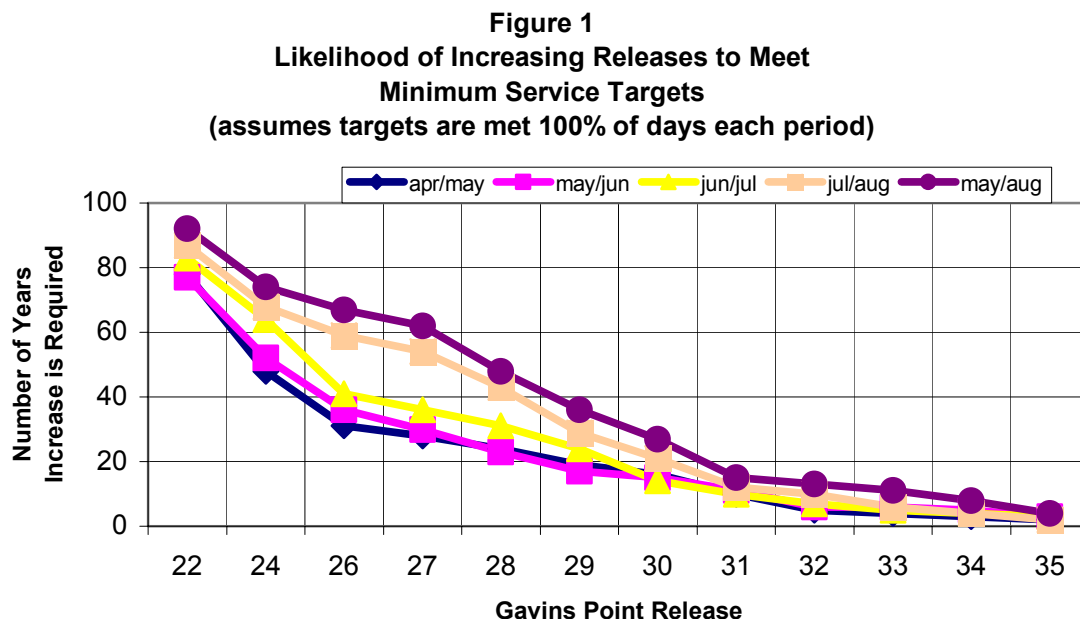
PROPOSED ACTION FOR THE 2003 AOP

The proposed action for the 2003 AOP combines elements of the 30-kcfs flat release and the flow-to-target option discussed in the final 2003 AOP released in January 2003. Selection of this proposed action for the 2003 AOP was based on the goals to minimize the loss of interior least tern and piping plover habitat and loss of eggs and chicks, to provide water conservation in the upper three reservoirs, and to minimize operation uncertainty for navigation. Based on discussions held between the Corps and the USFWS, the proposed action for the 2003 AOP is to set a release of 26 thousand cubic feet per second (kcfs) or higher (if releases to meet downstream targets is greater than 26 kcfs) from Gavins Point Dam, beginning when the listed least terns and piping plovers initiate nesting in early to mid-May. Immediately following the stabilization of the river stage at the 26-kcfs-release level, a field survey will be conducted to determine if certain known low-lying sandbars are inundated at the 26-kcfs level. It is preferable to inundate these known low-lying sandbars to minimize the loss of nests/eggs/chicks, in case it is necessary to increase releases later in the nesting season. If the low-lying sandbars in question were not inundated by the 26 kcfs release, an increase to no-more-than 27 kcfs would be initiated and held steady until increases above that level are needed to support downstream flow targets. The steady release will be initiated when the Missouri River Basin Water Management Division is notified by the Omaha District, Operations Division, Threatened and Endangered Species Section that birds have begun nesting.

Also, this release will, if necessary, be increased if tributary inflow plus the 26- to 27-kcfs Gavins Point Dam release falls below the level needed to meet downstream flow targets.

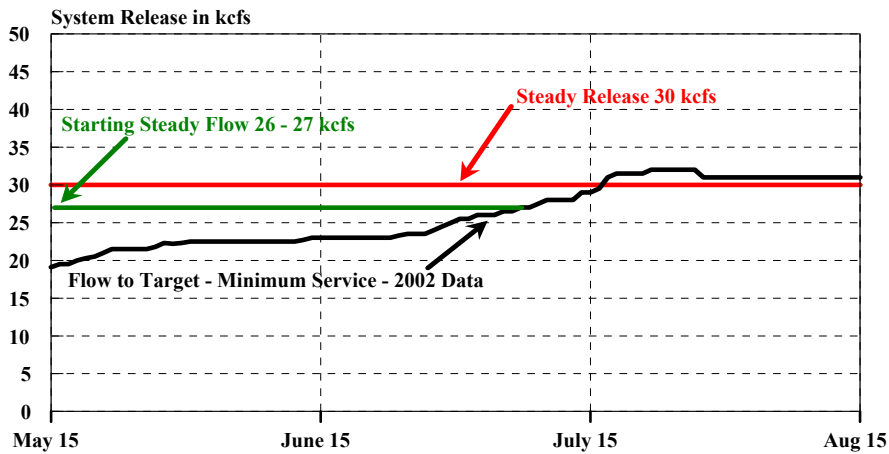
Options for the proposed action for the 2003 AOP that included reductions in releases to conserve water-in-storage, including a flow-to-target and steady release with reductions if release needs diminish, were analyzed and not considered in final deliberations due to the potential for inundation of large numbers of eggs and chicks if releases are subsequently increased (Table 1). When downstream requirements are met due to increased tributary inflow, Gavins Point Dam releases will, therefore, not be decreased under the proposed action for the 2003 AOP.

The probability of having to increase releases to meet minimum service targets was computed for the 100-year period of record for steady releases in the April/May, May/June, June/July, July/August and May/August time periods for Gavins Point Dam release levels ranging from 22 to 32 kcfs. It was determined that, under all levels, there is a high likelihood that release increases would be necessary at some point during the tern and plover nesting season to meet downstream flow targets (Figure 1).



To determine which plan best meets the goals to offset impacts to endangered species and minimizing impacts to authorized project purposes, a second analysis was conducted. A variety of starting steady-flow options were evaluated to determine the potential loss of eggs and chicks due to inundation, available habitat, and System water-in-storage conservation. Starting steady-flow options analyzed ranged from 22 kcfs to 30 kcfs. Figure 2 shows the proposed action for the 2003 AOP (at 26 kcfs) as compared to flow-to-target in 2002 and the 30-kcfs steady release.

**Figure 2. Mainstem System Release Options
Summer 2003 Water Management**



Current conditions are very similar to those experienced during the 1987-1993 drought; therefore, the Corps determined that the historic data from 1988, 1989, 1990, and 1991 provide a range of conditions that would likely simulate those that might be expected in the summer of 2003. Figures 3 through 10 depict the Gavins Point Dam releases (diamonds) that would be needed to meet downstream targets for the selected four years and how the Corps would operate to meet those targets (solid line made up of connected squares) for the range of starting steady flow options. Table 1 presents the results of the analysis of the alternatives for the various flow options.

Losses refer to eggs and chicks based on 2002 bird chronology that may be inundated by increased releases. Potential habitat is an estimate of the total habitat available at that release level. Effective sandbar habitat is potential habitat exposed for a duration sufficient to produce chicks (5 weeks). Water-in-storage conserved is compared to a steady release of 30 kcfs for the entire least tern and piping plover season versus actual 2002 flow-to-target data.

Analysis of the data in Table 1 shows that an initial steady release of 26 to 27 kcfs followed by a flow-to-target operation when flows fall below minimum service levels best meets the objectives stated above. An inflection point between 25.5 and 26 kcfs in Figure 11 illustrates that there is a disproportional increase in habitat that is likely to be inundated by small increases in flows. The proposed action was selected to minimize the amount of this exposed low-lying habitat and the potential associated loss of eggs and chicks that may occur if it was inundated after nest initiation. Additionally, this operation will facilitate the maximum use of habitat that is higher than the identified inflection point. Under this proposed action, the Corps may relocate nests and chicks to higher elevations, but does not anticipate collection of eggs or chicks for captive rearing. Consistent with the contingency plan of the November 2000 BiOp, movement of nests and chicks to higher elevations and captive rearing may, however, be considered to

Insert Figure 3

Insert Figure 4

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Table 1
Effects of Release Options on Terns and Plovers, their Habitat, and System
Water-in-Storage

Flow	Losses								Habitat		Water-in-Storage Conserved (Compared to 30 kcfs Steady) (ac-ft)
	plover		tern		total			potential	effective		
	eggs	chicks	eggs	chicks	plover	tern	total				
Flow-To-Target									na		555
1988		90	38	70	25	128	95	223		1175	
1989		44	53	41	36	97	77	174		800	
1990		39	45	49	31	84	80	164		1175	
1991		44	54	25	39	98	64	162		1175	
24 kcfs With Reductions Allowed									1250		522
1988		80	32	53	25	112	78	190		1175	
1989		23	13	9	3	36	12	48		750	
1990		26	25	29	21	51	50	101		1175	
1991		44	43	24	28	87	52	139		1225	
22 kcfs Minimum Risk									1550		534
1988		70	26	39	24	96	63	159		775	
1989		23	4	9	0	27	9	36		650	
1990		22	13	19	10	35	29	64		1000	
1991		40	24	18	14	64	32	96		1000	
24 kcfs Minimum Risk									1250		522
1988		70	26	39	24	96	63	159		1000	
1989		23	4	9	0	27	9	36		650	
1990		22	13	19	10	35	29	64		1000	
1991		40	24	18	14	64	32	96		1000	
25 kcfs Minimum Risk									1175		478
1988		66	26	40	24	92	64	156		1000	
1989		22	4	10	0	26	10	36		650	
1990		22	13	18	10	35	28	63		1000	
1991		39	24	18	14	63	32	95		1000	
26 kcfs Minimum Risk									1000		389
1988		49	24	32	21	73	53	126		1000	
1989		22	4	9	0	26	9	35		650	
1990		13	13	9	11	26	20	46		1000	
1991		15	25	6	14	40	20	60		1000	

27 kcfs Minimum Risk										925		284
1988		30	18	19	16	48	35	83			925	
1989		22	4	9	0	26	9	35			650	
1990		8	3	2	2	11	4	15			925	
1991		9	16	4	8	25	12	37			925	

28 kcfs Minimum Risk										800		172
1988		19	15	10	11	34	21	55			800	
1989		21	4	10	0	25	10	35			650	
1990		0	0	0	0	0	0	0			800	
1991		6	13	2	5	19	7	26			800	

30 kcfs Minimum Risk										750		-75
1988		0	0	0	0	0	0	0			750	
1989		21	4	10	0	25	10	35			650	
1990		0	0	0	0	0	0	0			750	
1991		0	0	0	0	0	0	0			750	

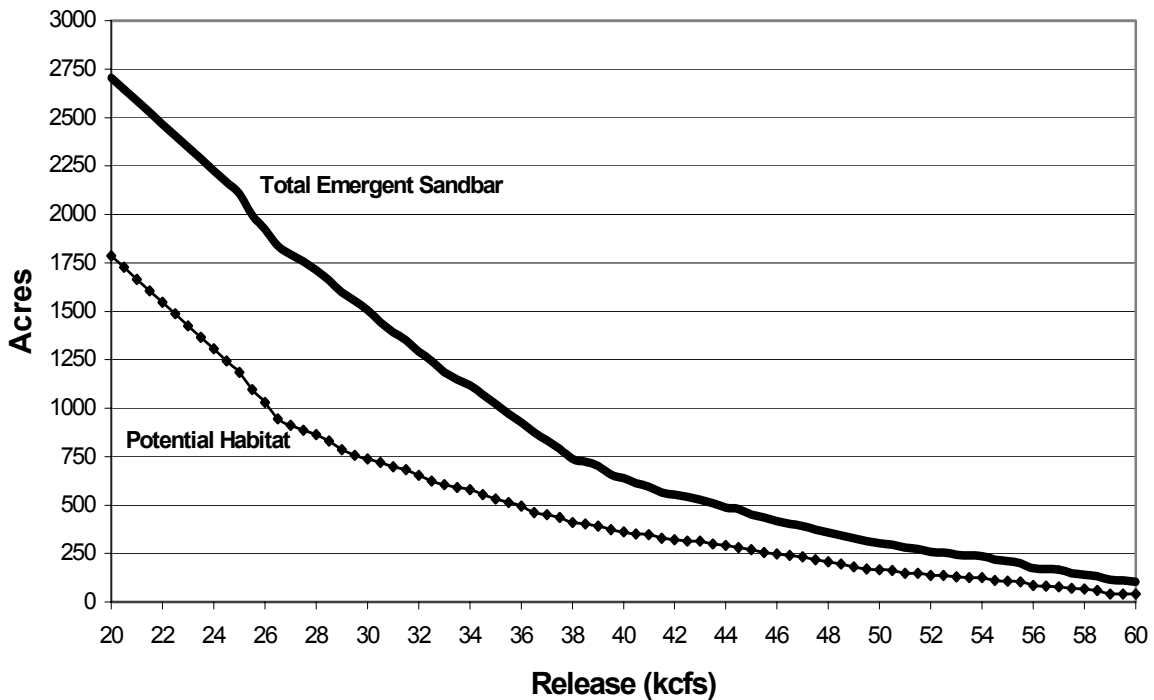


Figure 11. Amount of total emergent sandbar and potential habitat in the reach downstream of Gavins Point Dam for varying release rates in 2003.

minimize direct mortality associated with the application of the flood control criteria in the CWCP.

OTHER 2003 ACTIONS INCLUDED IN THE PROPOSED ACTION

In addition to the proposed action for the 2003 AOP, the following measures to minimize losses of the two listed bird species are also included as part of a more comprehensive proposed action. The comprehensive description of these measures can be divided into those that are needed to comply with the November 2000 BiOp and those that are not directly needed to comply with the November 2000 BiOp.

Proposed Actions not Directly Needed to Comply with the November 2000 BiOp

This section includes a listing of those actions to be taken by the Corps in 2003 that address listed species but are not included directly in the November 2000 BiOp. A more detailed description of some of these measures is found in the Corps' response, dated 14 March 2003, to the USFWS request for additional information, dated 5 March 2003.

1. The Corps will conduct an adult census and weekly productivity monitoring of all known and potential piping plover and least tern nesting sites within the Kansas and Missouri Rivers, beginning the last week of April through the end of the breeding season.
2. As recognized in the November 2000 BiOp, the Corps will maintain its "state-of-the-art" least tern and piping plover recovery program in 2003. This will include a 16-hour Productivity Monitoring and Survey Techniques course (including nest-moving methods) for all seasonal staff and permanent staff, including contractors working with least tern and piping plover activities.
3. The Corps will maintain an aggressive coordination effort between the USFWS, Water Management Division, dam operators, and the Omaha District' Endangered Species Section to evaluate and minimize losses due to water management.
4. Outreach efforts in 2003 include the production of a new interagency brochure on the least tern, piping plover and pallid sturgeon; the placement of additional interpretive signs at area boat ramps; endangered species programs at public venues; and public service announcements.
5. In 2003, predator management efforts will continue with the placement of predator exclosures over piping plover nests, evaluation of open topped cages for least terns, electrified predator barrier fences, and livestock exclosure fences on reservoir shorelines.
6. Garrison Dam releases will be restricted during the tern and plover-nesting season under all runoff scenarios. The reductions will be in the 500- to 1000-cfs range. Hourly peaking will be limited to no more than 33 kcfs for 6 hours if the daily average release is lower than 28 kcfs. Fort Randall Dam hourly releases during the 2003 nesting season will be limited to 37 kcfs. These restrictions will limit

- peak stages below the projects for nesting birds. Further power peaking restrictions will be considered at Fort Randall Dam to minimize losses.
7. The Corps will move nests threatened by rising water on river and reservoir reaches to higher, secure habitat when possible using recognized techniques.
 8. The Data Management System (DMS) for Threatened and Endangered Species will again be used during the nesting season. The use of the DMS, when coupled with gage data, helps reduce the likelihood of inundation by providing near-real-time survey and monitoring data to water managers.
 9. During periods when the downstream flow target is at Kansas City, the Corps will release water from the Kansas Reservoirs, as Congressionally authorized and described in the Kansas River Master Manual, to minimize tern and plover losses.
 10. Before increasing releases from Gavins Point Dam, an evaluation of the location of tows will be made to determine if release increases can be delayed without negatively impacting navigation.
 11. Minimum Service will be maintained through the bird-nesting season regardless of the System storage check on 1 July.
 12. It is anticipated that there will be a significant increase in human disturbance of nesting areas due to the Lewis and Clark Bicentennial. Law enforcement activities in 2003 will include the posting of nesting sites with restriction signs and fencing to reduce human disturbance. Also, the Corps will increase coordination of law enforcement patrols of nesting areas and integrate law enforcement activity logs into the DMS.
 13. The Corps will create sandbar habitat for terns and plovers, as presented in Attachment 5 of the Supplemental Information provided to the USFWS on 14 March 2003.

2003 Actions to Comply with the November 2000 BiOp

Pallid Sturgeon Population Augmentation. In 2003, the Corps is enhancing pallid sturgeon propagation activities at six rearing facilities to assist in achieving annual stocking goals. These include the Bozeman Fish Technology Center (FTC), Garrison Dam National Fish Hatchery (NFH), Gavins Point NFH, Neosho NFH, all operated by the USFWS; the Miles City State Fish Hatchery (SFH); and the Blind Pony SFH.

The “Propagation Workgroup”, cooperatively established by the Corps and the USFWS in 2002 and comprised of representatives from the Corps, USFWS, and the States of Montana and Missouri, will continue to prioritize propagation needs each year to facilitate achievement of the Corps “Average Annual Shortfall”, as defined in RPA Element VIA of the November 2000 BiOp. A prioritized list of propagation needs was

used to determine where Corps assistance was directed for the population/augmentation program in 2003.

The Corps has established the agreements listed in Table 2 in 2003 to enhance propagation efforts to achieve RPA Element VIA.

Table 2. 2003 Propagation-Related Projects.

Description/Project Title	Cooperator	Support
Propagation Activities, Infrastructure Improvements	Blind Pony State Fish Hatchery	\$41,500
Propagation Activities, Infrastructure Improvements	Neosho National Fish Hatchery	\$11,300
Propagation Activities, Infrastructure Improvements	Gavins Point National Fish Hatchery	\$37,920
Propagation Activities, Infrastructure Improvements	Garrison Dam National Fish Hatchery	\$39,267
Propagation Activities, Infrastructure Improvements	Miles City State Fish Hatchery	\$51,230
Propagation Activities, Infrastructure Improvements	Bozeman Fish Technology Center	\$36,838
Genetic Analysis	University of California, Davis	\$7,000
Total Propagation Support		\$225,055

This support continues the Corps commitment to RPA Element VIA and further enhances the variety of assistance the Corps provided for pallid sturgeon propagation enhancement in 2002. In 2002, the Corps assisted with pallid sturgeon propagation and population augmentation throughout the Missouri River Basin, directing \$640,595 toward propagation efforts. This support enhanced the capability of the propagation effort to provide consistent population augmentation, including:

- Improved Water Supply
- Water Quality and Disinfection
- Enhanced Cryopreservation Capabilities
- Feed and Feed Storage
- Fish Marking

Additionally, the Corps provided, and will continue to provide in 2003, assistance and training in Passive Integrated Transponder (PIT) tagging and assisted with pallid sturgeon stocking efforts. Stocking efforts included assisting with transporting of juvenile pallid sturgeon from “Upper” River hatcheries (upstream of Gavins Point Dam) to stocking sites in the “Lower” River (downstream of Gavins Point Dam). These stocking efforts marked the first time that pallid sturgeon originating from parentage of the “Upper” River were stocked into the “Lower” River.

Pallid Sturgeon Population Assessment. Pallid sturgeon and associated fish community assessments are continuing in 2003 through agreements with the States and the USFWS, targeting high priority Missouri River segments. Assessment activities are in accordance with a “draft” population assessment plan, being developed by a team of biologists from throughout the Missouri River Basin. These biologists have developed a set of “Standard Operating Procedures” for sampling the Missouri River, focusing on experimental design, a habitat classification system, gear and deployment techniques, collection of physical habitat data, and data recording. This plan will be completed in 2003 and will implement RPA Element VIB, providing vital long-term trend information of the pallid sturgeon and the associated fish community.

In 2003, the Columbia Fisheries Resource Office of the USFWS is continuing its sampling efforts in the Lower Missouri River. The Nebraska Game and Parks Commission is also conducting population assessment surveys from the mouth of the Platte River to Kansas City. The Missouri River Fish and Wildlife Management Assistance Office (USFWS-Pierre) is conducting population assessment activities in the Fort Randall Reach. In conjunction with this assessment, an analysis of pallid and shovelnose sturgeon food habits will be conducted. Table 3 summarizes the Corps’ efforts in support of population assessment activities for Fiscal Year (FY) 2003

Table 3 - Population Assessment Projects for FY 2003 with Corps Support

Description/Project Title	Cooperator	Support
Pallid Sturgeon Population and Habitat Survey	Nebraska Game and Parks Commission, Lincoln, NE	\$165,080
Annual Report for the Lower Missouri River Pallid Sturgeon Monitoring and Population Assessment Project	U.S. Fish and Wildlife Service, Columbia Fishery Resource Office, Columbia, MO	\$166,000
Pallid Sturgeon and Associated Fish Community Assessment in the Fort Randall Reach	U.S. Fish and Wildlife Service, Great Plains Fish and Wildlife Management Assistance Office, Pierre, SD	\$41,300
Total Population Assessment Support		\$372,380

In 2002, the Corps supported Population Assessment activities in high priority river segments. Several state agencies and the USFWS conducted pallid sturgeon population assessment surveys in accordance with “draft” assessment plans. Assessment activities incorporate an associated fish community approach in addition to the endangered pallid sturgeon, as required in RPA Element VIB. Assessment efforts have documented survival and growth of pallid sturgeon resulting from the population augmentation program.

Pallid Sturgeon Shallow Water Habitat. The November 2000 BiOp determined that between 12,000 and 19,500 acres of shallow water habitat (SWH) were needed to avoid jeopardy in the channelized reach of the river from Sioux City, Iowa to St. Louis, Missouri. The initial goal outlined in the BiOp was to have an additional 2000 acres by the year 2005. The following is a list of specific actions taken in 2002 and additional actions planned for 2003 to meet the 2005 acreage goal.

In FY 2002, 158 dikes were notched from River Mile (RM) 495 to the mouth and three dikes and one chevron were constructed near RM 554.5. Plans and specifications were completed for construction of 13 miles of dike modification and chevron construction from RM 555 to 542. Draft physical monitoring plans were developed. A 5-year plan for construction of 2000 acres of SWH by 2005 was drafted. Multi-dimensional math models were developed for three sites. These models will be used to predict future conditions and to help refine the design of future channel improvements. One off-channel chute was constructed.

In FY 2003, off-channel chute construction is planned for three sites. Dike modification will be accomplished from RM 555 to 542. The modification this year will be less than 13 miles due to real estate acquisition problems. Additional dike modifications upstream of Rulo, Nebraska, however, will be pursued at sites where real estate is either owned by the Federal Government or where the landowner is willing to accept the erosion. Plans are underway to notch approximately 160 dikes from RM 495 to the mouth. Detailed physical monitoring surveys will be conducted at six sites. Operation and maintenance schedules have been coordinated with the USFWS to insure opportunities are taken to create shallow water habitat where possible.

Focused Research. The Corps is conducting focused research activities for pallid sturgeon in FY 2003 as shown in Table 4.

Table 4 – Focused Research for Pallid Sturgeon in FY 2003

Description/Project Title	Cooperator	Support
Fort Peck Biological Data Collection Plan	U.S. Geological Survey/Montana Fish, Wildlife, and Parks	\$495,000
Fort Peck Spillway Fish Barrier	Golder Associates	\$100,000
Telemetry of Post-Spawn Pallid Sturgeon in the Missouri and Yellowstone Rivers	USFWS	\$50,000
Bathymetric Surveys of Habitats Using Known Locations of Pallid Sturgeon via Telemetry	U.S. Geological Survey	\$14,000
Total Focused Research Support		\$659,000

Pallid Sturgeon Spawning, Recruitment, and Survival Study. At the request of the Corps, the U.S. Geological Survey (USGS) is preparing a study proposal to identify the essential ecological factors that influence spawning, recruitment, and survival of pallid sturgeon in

the Missouri River. This study may examine the biological response of sturgeon to factors such as flow volume, frequency, duration, flood plain connectivity, water temperature, sediment transport, water quality, physical habitat, and others. It is anticipated that this study will be a multi-year effort and will commence in FY 2003.

Fort Peck Flow Enhancement Study. In 2003, the Corps continues its support of the preliminary biological data collection in preparation of the Mini-test and Full-test for the Fort Peck Flow Enhancement Study. The USGS and the Montana Fish, Wildlife, and Parks (MTFWP) are jointly conducting this study. In addition to the multiple components of this project conducted in 2002, an additional component will be incorporated to further assess larval sturgeon behavior in the laboratory as well as in the field. Additional laboratory work will be conducted on pallid sturgeon fry to further evaluate the behavior of the fry and this relationship to drifting in currents to quantify distances traveled during the drifting phase. The field component will utilize shovelnose sturgeon as a surrogate in this first year, as approval to use pallid sturgeon without a method to identify them as “stocked” may cause problems in identifying natural reproduction versus population augmentation efforts. The field component may provide “real-world” insight to either confirm or dispute the laboratory studies. All components of the Fort Peck Biological Data Collection Plan conducted in FY 2002 will continue in FY 2003.

Piping Plover Forage Ecology Study. The Piping Plover Forage Ecology Study, being conducted with the USGS Cooperative Research Unit at Virginia Polytechnic Institute and State University, will begin its third and final field season in 2003. The purpose of this study is to determine if variability in piping plover chick growth rates and days to fledging, both within the Missouri River and between Missouri River and Prairie Coteau nesting areas, is due to differences in forage resource availability. Study sites include Lake Sakakawea and the Missouri River below Garrison and Gavins Point Dams. A final study report is anticipated in early 2004.

Habitat Monitoring and Evaluation Program. In recent years, the potential importance that reservoir habitat may play in the recovery of least terns and piping plovers has been recognized. The Corps initiated a monitoring program in 2003 to assess the important characteristics of reservoir habitat, its abundance, and its distribution. In 2002, a GIS-based Reservoir Habitat Model (RHM) was developed to address the potential impact of various flow alternatives on reservoir habitat. Parameters for the model were chosen based on relevant literature, consultation with experts, and previous research of riverine habitat requirements for these species.

Reservoir habitat monitoring in 2003 will focus on verifying parameters utilized in the RHM and identifying key characteristics of least tern and piping plover habitat. In conjunction with the Environmental Monitoring and Assessment Program (EMAP) design team of the U.S. Environmental Protection Agency (EPA), an unbiased sampling design and appropriate response measures are being developed based on RHM output and historic nest records, and a pilot project will be implemented to support this effort on Lake Sakakawea in 2003. As a long-term monitoring tool, the reservoir monitoring plan

will allow statistically sound estimates of changes in habitat quantity and quality over time and will provide a basis for evaluating management actions.

Riverine habitat has been monitored as part of the Habitat Conservation and Recovery Plan since 1996. The objectives of the plan are to define and identify site-specific and landscape-level features of least tern and piping plover habitat, to quantify its extent and distribution on the Missouri River, and to develop and prioritize habitat management alternatives. This information is being used in the emergent sandbar habitat creation program. Riverine reaches of the Missouri River are scheduled to be sampled on a 3-year cycle. The Missouri River reaches below Fort Randall Dam and Gavins Point Dam will be sampled in 2003. Sampling will include field crews sampling elevation, vegetation, forage resources, and substrates in conjunction with either satellite or aerial remote sensing information.

Captive Rearing. The Corps initiated a peer review in 2003 using a topic-based-teams approach to facilitate a comprehensive review of its captive rearing program. On February 26 and 27, 2003, the Corps hosted a peer review of the animal husbandry and health aspects of the least tern and piping plover captive rearing program at the Gavins Point Project Office. The review team was composed of Nell McPhillips, USFWS; John Dinan, Nebraska Game and Parks Commission; Kim Smith, Milwaukee County Zoo; Kate Banks, New England Aquarium; and Dr. Joshua Dein, National Wildlife Health Lab.

The Animal Husbandry and Health Team conducted a focused “best practices” review of the physical facilities, the collection, incubation, brood rearing, and release protocols; animal handling and care practices; veterinary care guidelines; diet sources and food preparation; contamination containment and prevention; handling and disposal of mortality specimens; and operational guidelines for facility personnel. Inspection included a detailed review of products and technologies being used to ensure the most current, state-of-the-art products and methods are being put into practice with the Captive Rearing Program.

The next phase of the peer review process will focus on the long-term viability, sustainability, and appropriateness of the captive rearing program and the role it should play in the management and recovery of least terns and piping plovers within the region. The Corps has solicited the Conservation Breeding Specialist Group (CBSG) to facilitate a workshop that will develop detailed management recommendations for the two species by bringing together all the stakeholders. One of CBSG's primary strengths is that it brings a scientific approach to defining problems and determining management strategies for conservation activities, both in captivity and in the wild. The outcome of the CBSG workshop will provide guidelines that indicate if, and when, the Corps should use the Captive Rearing facility, as well as under what conditions captive rearing is warranted. September 2003 is being considered for the CBSG workshop.

ANTICIPATED EFFECTS OF THE PROPOSED ACTION FOR THE 2003 AOP

In light of the current conditions that exist on the reservoirs and in the river reaches in 2003, the Corps developed the proposed action for the 2003 AOP (to be referred to as proposed action in this section) outlined in the description of the proposed action. The effects described in this section of this report are based on a comparative analysis between the proposed action and the 30-kcfs flat-release option identified in the 2003 AOP. This means that the effects identified below for the proposed action will be relative to those that could have occurred under the 30-kcfs flat-release plan. As discussed above, some of the data will be presented for four representative years during the 1987 to 1993 drought. The Corps determined that there is a fair probability that the proposed action will provide more habitat for the birds early in the nesting season and, through implementation of measures to minimize loss, will extend the time that effective habitat is available and/or further enhance survival. Analysis of the proposed action has provided the following anticipated biological effects on least terns, piping plovers, and pallid sturgeon.

LEAST TERNS AND PIPING PLOVERS

Effects of the proposed action on least terns and piping plovers were evaluated for the direct take of eggs and chicks, the potential loss of productivity from any changes in habitat availability, and the impact of offsetting mitigating measures. A model was developed to assess the expected effect of various scenarios on least tern and piping plover eggs and chicks on the Missouri River between Gavins Point Dam and Ponca, Nebraska. The goal of the modeling was to provide an indication of the level of impacts that might occur under modeled release scenarios.

The model incorporated least tern and piping plover population and productivity parameters collected during the 2002 breeding census and productivity monitoring activities. Piping plover and least tern nest initiation dates, nest loss due to non-flood factors (e.g., predation, human disturbance, abandonment), hatching rates, chick loss due to non-flood factors (e.g., predation, weather), and fledging rates were modeled as weekly cohorts for the duration of the normal nesting season, described as the last week in April to the last week in August. Corresponding weekly maximum flow for each cohort was used in the model. Habitat availability was determined using November 2002 habitat estimates that were developed by sampling the elevation and availability of nesting habitat on ten randomly selected sandbars along the Gavins Point Reach (see Supplemental BA, dated January 22, 2003, and additional information letter to the USFWS, dated March 14, 2003). Specific habitat information is not available for the Fort Randall or Lewis and Clark Lake Reaches, therefore, limiting the discussion of anticipated losses on these reaches.

Each week, the model tracked nest initiations, nest loss, hatching, chick loss, and chick fledging, using 2002 productivity parameters. Various flow scenarios were then modeled to estimate impacts. The model incorporated the following assumptions:

- Least tern and piping plover population and productivity parameters were identical to those observed in 2002.
- In terms of elevation, nests were placed on the habitat using weighted probabilities based on availability.
- Nest loss and chick loss due to non-flood factors occurred uniformly throughout the nesting period and brood rearing periods, respectively.
- Nest loss due to non-flood factors occurred randomly and was independent of nest elevation.
- Chick loss due to flooding occurred in proportion to the overall amount of habitat that was inundated by increased flows.

Because random factors were included in the model, each flow scenario was simulated 100 times to provide a better estimate (mean) of potential impacts and an indication of potential variability (range).

Potential egg and chick losses from each weekly cohort and species were totaled to provide the values provided in Table 1. The values computed were not a precise expectation of loss that would occur, but rather a summary of the range of potential effects that might occur for the flow options bounding the proposed action. Expected impacts of the proposed action for the 2003 AOP to least tern and piping plovers on the Missouri River between Gavins Point Dam and Ponca, NE are shown in Table 5.

Table 5 - Expected Least Tern and Piping Plover impacts of 2003 Proposed Action for the 2003 AOP

Release	Least Tern		Piping Plover		Total	
	Eggs	Chicks	Eggs	Chicks	Eggs	Chicks
26 kcfs						
1988	30	20	47	24	77	44
1989	8	0	23	4	31	4
1990	9	11	11	13	20	24
1991	7	14	15	25	22	39
27 kcfs						
1988	19	16	30	18	49	34
1989	9	0	22	4	31	4
1990	2	2	8	3	10	5
1991	4	8	9	16	13	24

Actual values may vary from the estimated means by changes in the timing and magnitude of the expected flows, as well as differences in the least tern and piping plover productivity parameters and habitat selection assumed in the model. For additional information on model structure and functionality refer to the Supplemental BA, dated January 22, 2003, and additional information letter to the USFWS, dated March 14, 2003).

The four representative drought years provide an opportunity to simulate the range of expected impacts due to the proposed release alternative. Starting releases at 26 kcfs likely inundates low-lying sandbar habitat that would be at risk of inundation after nest initiation with releases needed later to meet downstream water targets. The number of nests and chicks potentially inundated is dependant on the timing and magnitude of the tributary inflow that occurs during the rest of the nesting season.

The year 1988 was relatively wet early in the nesting season followed by continued dry periods as the nesting season progressed. This type of year would result in releases of 26 kcfs through the peak of the nest initiation period (see Figure 7) followed by increasing releases as tributary inflows decline. This type of year would result in the potential for inundation of nests that were initiated when releases were at 26 kcfs. Some of this potential inundation may be offset by moving nests and chicks to higher secure habitat, use of Kansas River Reservoirs, and other measures, as described under the proposed action description.

In contrast to 1988, the number of nests inundated in 1989 would be relatively low but so would the amount of effective habitat available. The year 1989 was relatively dry and tributary inflow was low during the early part of the nesting season followed by intermittent tributary inflow events. This type of year would necessitate increasing releases early in the nesting season. The proposed release alternative does not include reductions in releases once they increase, so the remaining habitat would be relatively stable the rest of the nesting season.

The potential to inundate nests with a 26-kcfs release is much reduced in a year like 1990. Tributary inflows were good during the nesting season and, therefore, releases needed to meet downstream targets never exceeded 28 kcfs and only exceeded 26 kcfs during short periods from mid-July through August. Moving nests and other measures outlined to reduce impacts to nests would likely prevent any inundation in this type of year.

The year 1991 had a similar pattern of tributary inflow as 1988 but the magnitude of releases needed to meet downstream targets was slightly higher and the need to increase releases substantially above 26 kcfs came later in the nesting season. Potential inundation of nests would be less than in 1988 but more than what would be expected in 1990. Irrespective of the timing and magnitude of the tributary inflow and its effect on releases to meet downstream targets, much of the potential inundation may be avoided by implementing the actions to minimize effects described in the proposed action description.

Figures 12 and 13 show the data computed by the least tern and piping plover models, respectively, on the percent success of the chicks fledging, assuming 1988 release requirements for the proposed action. Some of these data are included in the summary of impacts in Table 1. The figures also include nest initiation and successful hatching from these nests based on historical database numbers.

As stated, effect of the proposed action may vary from the estimated means by changes in the timing and magnitude of the expected flows, as well as differences in the least tern and piping plover productivity parameters and habitat selection assumed in the model. Losses may range from as high as 178 eggs and chicks in a year such as 1988, to a low of 5 eggs and chicks in a year like 1990. While the Corps recognizes that losses of least tern and piping plover eggs and chicks may occur under the proposed action, much of the potential effect can be avoided or mitigated by implementing the actions to minimize effects described in the proposed action description. Extending the effective habitat availability through use of the Kansas Reservoirs, evaluating tow locations, and maintaining minimum service throughout the breeding season will increase productivity through reducing nest loss and enhancing chick survival. Also, by considering further power peaking restrictions, moving at-risk nests on river and reservoir reaches to higher secure habitat, and through close coordination between field biologists, water managers and dam operators, additional potential production will be preserved by preventing their inundation.

**Figure 12. Least Tern Nest Initiations & Nest Success
Below Gavins Point - 1988 Release Analysis.**

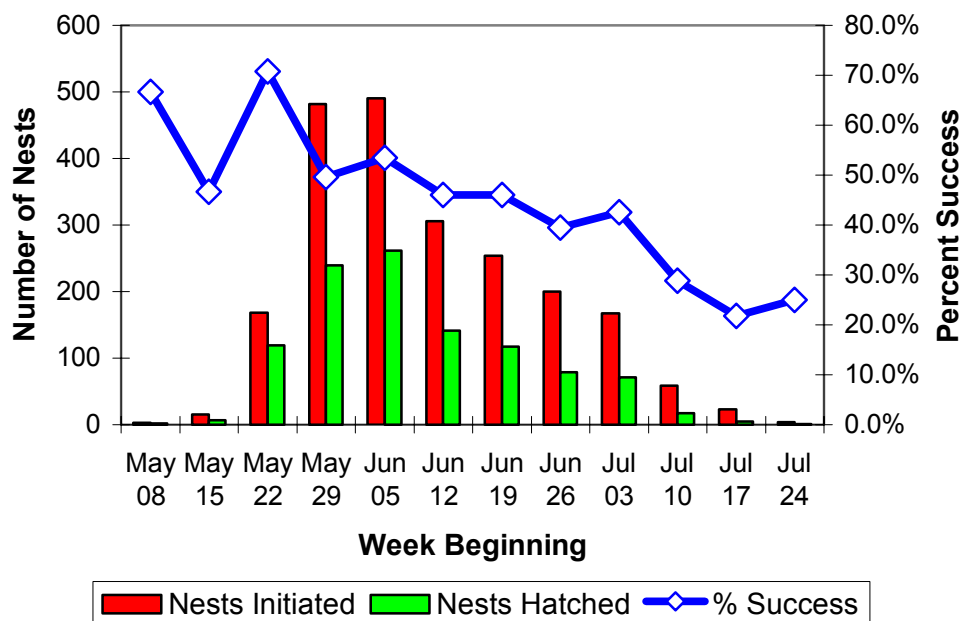
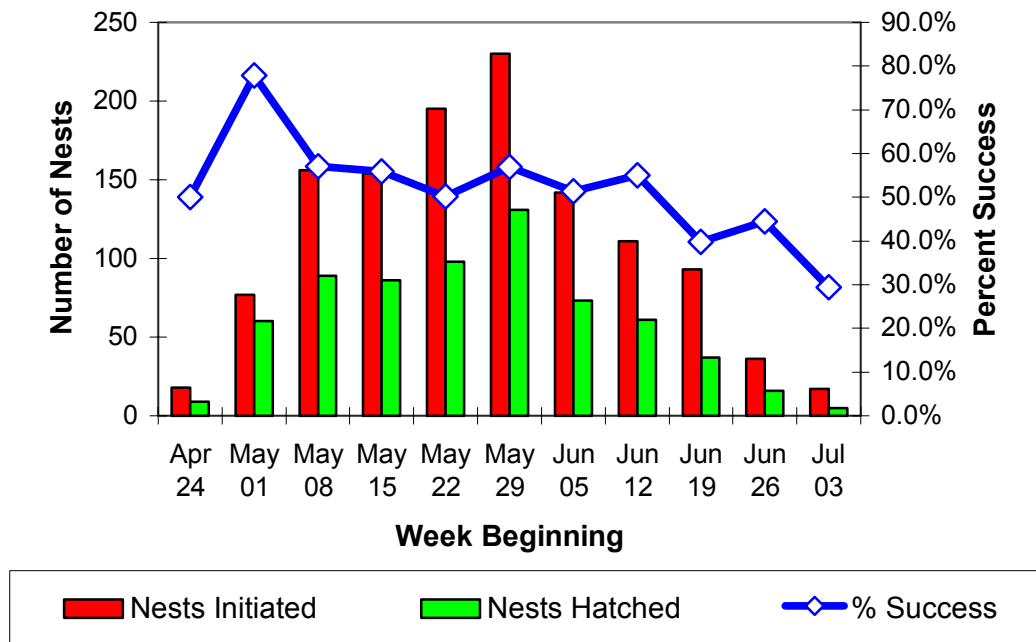


Figure 13. Piping Plover Nest Initiations & Nest Success - Below Gavins Point - 1988 Release Analysis.



Through intensive nest monitoring activities, outreach and enforcement, predator management, and development of additional emergent sandbar habitat, losses of nests and eggs, exacerbated by declining habitat conditions, will be reduced in 2003.

On Lewis and Clark Lake, most nesting was limited to two sites on the lake in 2002. RM 833.0 had 41 nests, and RM 827.0 had 15 nests. Both were low sandbars that have become highly vegetated. By the end of the nesting season, RM 833.0 had also become partially flooded. It is doubtful that this sandbar would have a high usage by the birds in 2003. The bar at RM 827.0 was used late in the season by a colony of terns. Nest success was poor with only three of fourteen nests hatching, but five chicks were fledged; therefore, the Corps expects the terns to return to this site and try again in 2003.

Downstream of Fort Randall Dam, nesting occurred at six major sites in 2002, RM 869.6, RM 867.0, RM 854.5, RM 854.0, RM 851.6 and RM 848.5. The sites at RM 854.5, RM 854.0, and RM 848.5 will be subject to inundation in 2003 with higher releases under the proposed release alternative. With releases between 26 kcfs and 28 kcfs from Fort Randall Dam, sites at RM 854.5 and RM 854.0 will likely be submerged. Between 28 and 30 kcfs, sites at RM 848.5 will likely be submerged.

The sites at RM 867.0 and RM 851.6 will be reduced in size by increased flows but will not be completely submerged by releases of up to 30 kcfs from Fort Randall Dam. These two sites, however, have become heavily vegetated and did not have any successful nests in 2002. Use of these two sites by the birds would likely be minimal in 2003, based on vegetation encroachment and lack of nest success. As described in attachment 5 in the

additional information letter to Service, dated March 14, 2003, habitat enhancement activities are proposed for sites on the Fort Randall Reach during 2003. Removing vegetation from higher elevation areas and improving nest site suitability is intended to maintain tern and plover productivity on the Fort Randall Reach in 2003.

The site at RM 870.2 contained over 40 percent (42/102) of all the tern and plover nests on the Fort Randall Reach in 2002. Both least terns and piping plovers successfully fledged young off this site. It is expected that this will again be a major nesting site in 2003. Habitat on this sandbar will be reduced at higher releases from Fort Randall Dam, but the sandbar here is quite large with high elevation in the interior. Nests could be moved to a higher elevation with an increase in releases. Chicks would not be affected by higher releases, as they would move to the interior.

PIPING PLOVER CRITICAL HABITAT

The Service designated critical habitat for the northern Great Plains population of the piping plover (67 FR 57638) including the Missouri River population in September 2002. In Montana, critical habitat was designated on Fort Peck Lake (77,370 acres (31,310.6 ha.), and 125.4 miles (201.8 km) of the Missouri River below Fort Peck Dam (RM 1712.0 to RM 1586.6). In North Dakota, critical habitat includes 18.6 miles below Fort Peck Dam (RM 1586.6 to RM 1540.0), 179 miles of river on Lake Sakakawea above Garrison Dam (RM 154.0-RM 1389.0), 87 miles of river below Garrison Dam (RM 1389.0-RM 1302.0), and 70 miles of river on Lake Oahe (RM 1302.0-RM 1232.0). In South Dakota, critical habitat includes 159.7 miles on Lake Oahe (RM 1232.0-RM 1072.3); 36 miles (57.9 km) below Fort Randall Dam (RM 880.0- RM 844.0), 32.9 miles (52.9 km) on Lewis and Clark Lake (RM 844.0-RM 811.1); and 58.9 miles (94.8 km) below Gavins Point Dam (RM 811.1-752.2).

Primary constituent elements of the northern Great Plains population of the piping plover are those habitat components (physical and biological) essential for the biological needs of courtship, nesting, sheltering, brood rearing, foraging, roosting, intraspecific communication, and migration. On rivers, the physical primary constituent elements include sparsely vegetated channel sandbars, sand and gravel beaches on islands, temporary pools on sandbars and islands, and the interface with the river. On reservoirs, the physical primary constituent elements include sparsely vegetated shoreline beaches; peninsulas; islands composed of sand, gravel, or shale; and their interface with the water bodies.

Considering the short duration and nature of impacts to critical habitat for the proposed flow scenarios and 1) the offsetting habitat measures already being implemented under management actions to implement the November 2000 RPAs; 2) naturally expanding habitat on reservoir shorelines under the 2003 drought conditions on Lake Sakakawea and Lake Oahe (22-foot reduction at Lake Sakakawea and 24-foot reduction at Lake Oahe), including designated critical habitat; and 3) the total amount of designated critical habitat for the northern Great Plains breeding population under expected conditions of this habitat in 2003 (e.g., drought conditions on prairie wetlands will likely produce more

shoreline nesting habitat for piping plovers), the Corps does not believe that this proposed action will appreciably reduce the value of critical habitat for both the survival and recovery of the northern Great Plains breeding population of the piping plover.

Additionally, with the reductions in service level support from full navigation service to support downstream uses to minimum service, the estimated amount of riverine effective sandbar habitat will be between 650 to 1000 acres below Gavins Point Dam during the 2003 nesting season. This habitat, coupled with the habitat on the river below Garrison Dam and the abundant habitat on the reservoirs, the Corps expects to meet the fledge ratios outlined in the November 2000 BiOp.

LEAST TERN AND PIPING PLOVER PRODUCTIVITY

Fledge ratio goals outlined in the 2000 BiOp have been met in 4 out of the past 5 years for piping plovers and the last 5 years for terns; however, the November 2000 BiOp prescribes that fledge ratios be calculated on a 3-year running average. As presented in the Supplemental BA, dated January 22, 2003, the Corps determined that 0 least terns and 41 piping plovers need to be fledged in 2003 to meet the 3-year running average fledge ratio goals of 1.13 for piping plovers and 0.70 for the least tern. Considering the habitat conditions existing throughout the Missouri River System and implementation of offsetting mitigation measures to maintain security of this habitat, the Corps believes that productivity goals will continue to be met in 2003 and future years if the proposed action is implemented.

PALLID STURGEON

Models that assess impacts to SWH are not sensitive enough to discern an effect of the flow portion of the proposed action. Actions taken toward implementation of the November 2000 RPA, including creating 2000 acres of SWH by 2005, however, will have a positive effect on the pallid sturgeon.

Focused research and population assessment studies in 2003 will provide better information on which to base future management decisions. Population augmentation activities in 2003 will help avoid jeopardy to the sturgeon by insuring recruitment of pallid sturgeon into the wild population until natural reproduction occurs and is documented.